

B16383-123532-XX-XX-PR-ZA-DH0133 - QUY Sampling Plan February 2025

Queensferry STC Effluent Sampling Proposal

Issue and Revision Record

| Revision | Date | Originator | Checker | Approver | Description |
|----------|----------------|---------------|-------------|-------------|--|
| A | September 2024 | Shannon Stone | Anita Manns | Anita Manns | First Issue |
| B | February 2025 | Shannon Stone | Anita Manns | Anita Manns | Updated to include omitted emission and sampling point |

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Commitment

Dwr Cymru Welsh Water (DCWW) commits to undertaking (using a United Kingdom Accreditation Service (UKAS) accredited laboratory or equivalent - where suitable and available):

- chemical analysis of the waste water which tests for ALL likely pollutants which DCWW expect to find in the discharge (not just Ammonia, BOD, Solids, flow, pH and data on bio-eliminability) and that DCWW will use an appropriate 'minimum reporting value' (MRV) (usually 10% of the environmental quality standards (EQS) where this is analytically achievable); and
- the sampling and chemical analysis being undertaken in line with the guidance on surface water pollution risk assessment for your environmental permit – GOV.UK (www.gov.uk) for all pollutants expected to be found.

Liquor Monitoring Proposal

DCWW are committed to providing information about the characteristics of the wastewater streams from the Queensferry STC, entering the adjacent Queensferry WwTW and are undertaking a review of our commitment to (under the BREF guidance Best Available Techniques (BAT) conclusion) BAT 3, 6 and 7 further details of which are set out below.

Our review includes, but is not limited to, requesting companies providing national laboratory services to provide information relating to their capacity to analyse return liquor matrix for the determinants listed in the guidance.

Such information is essential in order for DCWW to complete the review of our liquor monitoring proposal and delivery of BAT 3, 6, and 7. DCWW plan to complete this at the earliest opportunity. These enquiries remain open with each of the applicable laboratory services, at the time of writing, with no confirmed date for receipt of a response.

DCWW will provide an updated proposal to the NRW in line with a revised IED programme and in the meantime, we would like to assure the NRW of our commitment to sample liquor returns at Queensferry, our commitment to BAT 3, 6, and 7 and the following:

a) Summary of the sampling and analysis methodology of the effluent discharged and likely pollutants in the effluent (Guidance Monitoring discharges to water: guidance on selecting a monitoring approach - GOV.UK and Surface water pollution risk assessment for your environmental permit - GOV.UK).

Under BAT 3, DCWW will establish and maintain an inventory of wastewater. DCWW will carry out the sampling and analysis methodology of the effluent discharged at defined and recorded locations. All sampling, analysis and reporting will be undertaken by trained personnel, accredited to the Environment Agency's Monitoring Certification Scheme (MCERTS) standards or equivalent, where this is suitable and available. DCWW will ensure to document sampling procedures with details such as:

- precise location of the discharge sampling point including a grid reference.
- sampling process.
- storage conditions and transport of samples.
- types of bottles or containers and their closures.

A management system will be used to ensure the results are recorded and subject to review to include, but not be limited to, the following procedures:

- sampling programme, including procedures for resampling.
- data review and reporting
- training and audit.

DCWW propose a minimum of 12 sampling runs over a 12-month period (1 full sampling spec per month), initially, to establish a baseline, in accordance with the surface water pollution risk assessment guidance or other applicable guidance.

DCWW will then take an informed viewpoint of the determinands the samples contain demonstrating those that are not in the sample. DCWW will use an appropriate MRV (usually 10% of the environmental quality standards (EQS) where this is analytically achievable). An H1 assessment to screen out any that are not applicable or relevant will be completed.

b) A written statement with a commitment to undertake the sampling and analysis in line with BAT 3.

The purpose of BAT 3 in relation to return liquors is to establish and maintain an inventory of wastewater streams, as part of the environmental management system, to facilitate the reduction of emissions to water. In accordance with BAT 3 the following data will be provided:

- i. Simplified process flow sheets that show the origin of the emissions. Flow calculations based on an assessment of throughput may be used.
- ii. Descriptions of process-integrated techniques and wastewater treatment at source including their performances. Chemicals used for thickening and dewatering should also be stated.
- iii. Thickening and dewatering liquors, which comprise the major component of the returns, will be subject to monitoring for: Ammonia; BOD; solids; flow and pH.
- iv. Data on bio-eliminability (e.g. BOD)

DCWW is committed to providing information about the characteristics of the identified liquor return sampling points, namely average values and variability of calculated daily flows. In addition, DCWW is committed to further undertake the sampling and analysis of ammonia, BOD, solids and pH.

Sampling and analysis will be undertaken in line with BAT 3 using a UKAS accredited, or equivalent, laboratory, where available.

c) A written statement with a commitment that those undertaking the sampling and analysis will be by accredited to MCERTs or provide evidence of equivalent standards.

DCWW is committed to perform sampling and analysis in accordance with MCERTS, ISO/IEC 17025 or equivalent standards.

The chemical analysis of the effluent and liquor return samples will be analysed in a UKAS accredited laboratory, where available.

d) A plan which identifies the effluent sampling point(s) and emission point for the effluent discharge from the installation and the NGR of the effluent sampling point/s

DCWW has identified process/drainage lines, at Queensferry STC, which return liquors and wastewater from the sludge treatment area to the head of works. The primary wastewater streams are currently identified, as per drawing Site Layout Plan document reference B16383-123532-XX-XX-DR-ZA-DH0116 – QUY Site Layout Plan February 2025 as follows:

- S01 – Centrate liquors returns well
- S02 – Thickener liquors returns well
- S03 – Anaerobic digester (AD) No. 1 condensate trap
- S04 – Anaerobic digester (AD) No. 1 condensate trap
- S05 – Gas bag condensate trap
- S06 – Surface water (within bund) pumping station

Other streams identified are – all divert to the returned liquors storage tank which discharges to the head of the works.

- STC surface water run-off.
- Washdown for maintenance and cleaning.
- Digester bund rainwater

Sludge thickening liquors

Sludge is thickened to approx. 7-8% dry solids. A polymer is used in the thickening plant dewatering process to aid in binding the solids and predominantly remains in the thickened sludge solids. The thickener liquors discharge into the thickener returns well (ref 33), then into the returned liquors tank (ref 18), which also collects surface water run-off from the STC impermeable areas and liquors from the humus tanks and discharged before storm separation to the head of the works, pre-screen. The ammonia concentration at this point is likely to be low, the same as the urban wastewater stream it has come from.

Digested sludge dewatering liquors

Digested sludge is dewatered in the centrifuge which is designed to raise the percentage of dry solids in the sludge to approximately 25%. The centrifuge, by means of a rapidly rotating centrifuge bowl, removes additional water from the sludge. A polymer is used in the dewatering process to aid in binding the solids and predominantly remains in the dewatered sludge solids.

The dewatered cake is then transferred to one of three 70m³ cake bays.

After the dewatering process, the centrate liquors discharge into the centrate returns well (ref 32) which discharges to the inlet works pumping station, and pumped directly to the primary settlement tanks.

Biogas Condensate

A very small volume, approximately 3m³/d in total, of condensate is produced from gas condensate traps on biogas lines. The result of this is a liquid waste stream made up mostly of condensed water

vapour. The condensate trap systems are sealed, with no chemical addition. All condensate from the flare stack, digesters and gas bag holder is collected in the condensate traps adjacent to the assets and directed along the condensate line to the condensate. This discharges to the inlet works, pre-screen.

A sample can be taken directly from the traps. There is no solids, BOD or ammonia load in the condensate which discharges to the inlet works pre-screen and not via the returned tank.

OCU liquors

The following sludge treatment processes are covered or enclosed (with corresponding site layout plan reference):

- Digested sludge storage tank (Zone 2) (ref 21)
- Digester feed tank (ref 15)
- Digesters 1 (ref 5) & 2 (ref 6)
- Sludge holding tanks (aka consolidation tanks) 1 (ref 14) & 2 (ref 13)
- Screened sludge tank (ref 17)
- Imported sludge tank (ref 18)
- Returned liquors tank (ref 16)
- CHP engine (ref 4)
- Gas holder (ref 7)
- Dual fuel boilers 1 & 2 (ref 2)
- Gas oil boiler (ref 3)
- Drum thickener (ref 31)
- Centrifuge (ref 26)
- Biogas flare (ref 1)
- Standby generator (ref 8)
- AD condensate trap 1 (ref 34) & 2 (ref 35)
- Gas bag condensate trap (ref 36)

The following sludge treatment processes are open or uncovered (with corresponding site layout plan reference):

- Cake (digested) bays (ref 28)
- Centrifuge feed tank (ref 25)
- Centrate returns well (ref 32)
- Thickener returns well (ref 33)
- Digested sludge tanks Zone 1 (ref 19 & 20), Zone 3 (ref 24), Zone 4 (ref 30) and Zone 5 (ref 29)
- Rotamat (screen) (ref 23)
- Screenings skip (ref 22)

Additional works are underway, as part of this scheme, for odour cover improvements to replace existing covers that are in poor condition. DCWW will make odour cover improvements on the following assets:

- Sludge import tank

- Liquor return storage tank
- Indigenous sludge storage tanks no's.1 and 2
- Digester feed sludge storage tank
- New enclosure on imported sludge screening skip

There are no plans to cover the digested sludge tanks in Zones 1, 3, 4 & 5 or the centrifuge feed tank. The decision behind this is that the Site is due to be decommissioned before the end of AMP 8, although a date is yet to be confirmed,

The Site currently does not have any operational odour control units (OCUs). However, works are underway as part of the Queensferry IED Odour Control Scheme to install new OCU's, to replace the current non-functioning OCUs, to comply with the IED and BAT requirements.

The provision of new odour control treatment system - AWT Dry (Peacemaker chlorinated shale) system (similar to the existing odour unit on site as part of the wastewater treatment) at the works to treat combined extracted odorous airflow from the following locations:

- Sludge import tank
- Liquor return storage tank
- Imported sludge screen and screening skip
- Thickener building including direct extraction from existing drum thickener
- Indigenous sludge storage tanks no's.1 and 2
- Digester feed tank

The OCUs will have an odour removal efficiency of 99.5% for both systems. The extracted odours combine from the above locations to new odour abatement plants to give reduced odour emission from a 315mm x 5m high stack, and total flow rate of 2,470m³/hr – 15m/s at a maximum of 1,000 ou/m³. Treated odour streams are discharged to the environment through the OCU stacks and monitored hourly to ensure the absence of odorous compounds.

Improvements will be implemented in line with the recommendations in the odour impact assessment.

Boiler wastewater

Boiler blowdown contains concentrated hardness which would be damaging to the internal of a boiler but not at all significant in relation to Urban Wastewater Treatment. Volumes are in the order of less than 1m³/day. They are returned to the head of the works.

Site surface rain run-off

There are surface water drains in the sludge treatment area of Queensferry STC which are returned to the head of the works via the surface water pumping station

Washdown for maintenance and cleaning

There is maintenance and cleaning within the sludge treatment area onsite at Queensferry STC. Final effluent from the wash water system will be adequately diluted.

Storm bypass

The stormwater drainage of potentially uncontaminated areas from within the Site boundary will be routed back to the head of the works, via the surface water pumping station. Digestate and effluent from the STC are returned to the process downstream of storm separation. Returns from the return liquor tank come in before storm overflow, therefore, flows from the return liquor tanks could physically escape down the storm route, if the WwTW is in storm with a flow greater than 277l/s.

There are two storm tanks on site, one is blind and, therefore, cannot enter into the environment the second has a weir effect, so once full, it will weir over to storm outfall. However, any discharge will be substantially diluted by the incoming flow.

The centrate is pumped to the primary tanks and must pass through treatment before going out to the environment. Centrate cannot enter the environment through storm overflow.

Sample locations

We propose to sample the wastewater streams described above as set out below in Table 1 which lists the location identified as a provisional sampling point and waste waters present. It is proposed that, as the centrate and thickener liquor and condensate are able to be sampled at separate locations before discharge.

Table 1: Sample points

| Sample Point | Grid Reference |
|---|-----------------------|
| M01 – Centrate liquors returns well | SJ 32261, 68246 |
| M02 – Thickener liquors returns well | SJ 32306, 68240 |
| M03 – Anaerobic digester (AD) No. 1 condensate trap | SJ 32357, 68288 |
| M04 – Anaerobic digester (AD) No. 2 condensate trap | SJ 32375, 68275 |
| M05 – Gas bag condensate trap | SJ 32382, 68262 |
| M06 – Surface water PS | SJ 32330, 68253 |

Composite Sampling

DCWW will sample the location shown in Table 1 in accordance with NRW Guidance. Where individual flow proportional samples are taken at each sample point, each flow proportional composite sample may be combined to provide a single flow proportional 'bulk' composite sample for analysis. Return flow data will be used to ensure the single bulk composite sample is representative of the total flow returned.

Location of liquor returns.

The wastewater treated emissions and uncontaminated rainwater run off identified in this document enter the inlet before the storm overflow (with the exception of centrate) and, therefore, these emissions could bypass the WwTW treatment or be emitted as a diluted, direct discharge to water.